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Forest Health Protection

Pacific Southwest Region

Date: July 13, 2004
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To: District Ranger, Warner Mountain Ranger District, Modoc National Forest

Subject: Forest Insect and Disease Evaluation of Stand 36,
Briles Reservoir (NE04-07)

At the request of Dan Hubbard, Silviculturist, Forest Health Protection (FHP) personnel conducted a field evaluation of Stand 36, his silvicultural certification stand, within the Briles Bald Eagle Habitat Area on June 8, 2004 (conducted by Danny Cluck, FHP Entomologist) and again on June 23, 2004 (conducted by Bill Woodruff, FHP Pathologist). The objectives of our visits were to evaluate the current forest health conditions within the stand, discuss what influence these conditions would have on stand management objectives and provide recommendations as appropriate. Dan Hubbard accompanied us to the field on both occasions.

Background

Stand 36 is located just northeast of Briles Reservoir along the northwest edge of the Warner Mountains. The elevation of the site is approximately 5400 feet with precipitation averaging from 16 to 20 inches per year. The 45-acre stand is dominated by ponderosa pine (*Pinus ponderosa*) with a limited amount of white fir (*Abies concolor*) and western juniper (*Juniperus occidentalis*). The average basal area (BA) is 147 sq. ft./acre and the stand density index (SDI) is approximately 230. Harvest activities that have occurred within the stand include the past removal of the overstory and thinning of second growth ponderosa pine approximately 25 years

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ago. The average tree age within the stand is 95 years.

The objectives for this area are to: 1) lower the susceptibility of the stands to bark beetle caused mortality by reducing the current stocking levels and reducing the levels of dwarf mistletoe infection which will increase the growth and vigor of the residual trees, 2) increase the growth rate of mid-story and overstory trees to improve habitat for bald eagles, 3) reduce potential fuel ladders, thereby reducing the potential for loss of habitat by stand replacing fire, and 4) increase bald eagle habitat suitability through the removal of suppressed understory trees, including juniper. No trees larger than 21" diameter breast height are designated for removal.

Observations

Western pine beetle (*Dendroctonus brevicomis*) and mountain pine beetle (*Dendroctonus ponderosae*) are currently attacking and killing small, 5-10 tree, groups of ponderosa pine throughout the area. There are an estimated three group kills located within the boundaries of Stand 36. One of these group attacks occurred between the June 8 visit and the June 23 visit.

Western dwarf mistletoe (*Arceuthobium campylopodum*) has infected approximately 20 acres of ponderosa pine within Stand 36. Infection levels vary from light to severe with the overall dwarf mistletoe rating (DMR) being 3. Infected trees include both overstory and intermediate pine.

Discussion

Based on recent FHP observations (FHP Report NE04-03), bark beetle caused mortality of ponderosa pine in the Briles Reservoir area began approximately two years ago and has increased dramatically since last summer. Bark beetle caused mortality is also increasing throughout the rest of the Warner Mountains and extreme northeastern California due in part to five years of below normal precipitation. For example, Cedarville annual precipitation from 1999-2003 was below normal for all five years (Table 1). These drought conditions combined with high stand density have increased the susceptibility of many trees to successful bark beetle attack.

Table 1. Cedarville Annual Precipitation 1999-2003.

YEAR	Total Precipitation (in)	% Of Average (12.96")
1999	9.63	74%
2000	8.25	64%
2001	9.62	74%
2002	7.76	60%
2003	12.5	96%

Infection of ponderosa pine by western dwarf mistletoe is also impacting tree health and vigor within the Briles Reservoir area. Dwarf mistletoe obtains its nutrients and water from its host. Heavy infections (DMR of 3 or higher) can lead to growth loss and decreased survival. A small tree that is heavily infected with mistletoe is unlikely to grow into a large tree, and a large tree that is heavily infected has a significantly decreased life span in comparison to an uninfected

tree.

Effectively managing dwarf mistletoe infection levels generally requires, at a minimum, the removal or killing of heavily infected trees or branches. Where tree regeneration is a management objective for the stand, the removal or killing of infected overstory trees is needed to allow for healthy seedlings to develop in the understory. Dwarf mistletoe disperses most seed from tops of large trees 60 feet from the plant (further when wind aids the spread). Thus, spread tends to be most efficient in multi-storied stands of the same host tree species. Removal of all heavily infected trees, especially heavily infected trees in the overstory, combined with general stand thinning will reduce the spread and intensification of mistletoe to insignificant levels while increasing the health and vigor of trees with light infections. Where tree regeneration is not a management objective, light dwarf mistletoe (DMR of 1 or 2) can be present without significantly affecting tree growth as long as site resources are not limiting.

Management Alternatives

(1) **No action**

The overstocked condition of Stand 36 in the Briles Reservoir area will persist and increase over time. With this increase in stand density, and the protracted periods of below average precipitation that occur in northeast California, there is an increase in the probability of bark beetle-related mortality. Western dwarf mistletoe will continue to spread within the stand. Young ponderosa pine establishing under an infected overstory will most likely become infected and not reach maturity. Existing mistletoe infections will also intensify within individual pines reducing their growth and further increasing their susceptibility to successful bark beetle attacks and subsequent mortality. Although some mortality may be desired for snags, small openings and for future down woody debris, the no action alternative will most likely result in unacceptable levels of mortality and fuel accumulation.

(2) **Mechanical Thinning**

Thinning from below to a stand density that is 80% or less of "normal" for the site would effectively reduce tree competition for limited water and nutrients and reduce the susceptibility to future bark beetle related mortality. Furthermore, selecting for more drought tolerant species such as ponderosa pine over white fir will make the stand more resilient to disturbance agents such as insects, disease, and fire. Thinning can also decrease the need to enter stands to conduct salvage operations, decrease the amount of fuel loading and reduce the number of hazard trees. When carrying out thinning treatments, it is recommended that a registered borate compound be applied to all freshly cut stumps >14" dbh. This will reduce the chance of successful colonization of stumps and roots by the root disease fungus *Heterobasidion annosum*.

(a) Mechanical thinning plus mistletoe eradication

Thinning the stand as described above plus an emphasis on removing all dwarf mistletoe infected trees from the stand would effectively reduce dwarf mistletoe

infection to insignificant levels. However, this type of treatment may result in lower than desired stocking levels and create openings within the stand that do not meet management objectives. Since no trees over 21" dbh are to be designated for removal, large infected trees would have to be killed or have all susceptible host trees within 60 feet (more if wind aids the spread) removed from around them to prevent mistletoe from spreading to adjacent trees.

(b) **Mechanical thinning plus selective removal of infected trees (recommended)**

Thinning the stand as described above plus an emphasis on removing only the most heavily infected trees (DMR 3 or greater) would reduce dwarf mistletoe infection to a level whereby spread would be greatly reduced within the stand while increasing the health and vigor of lightly infected trees (DMR 1 and 2). Heavily infected trees greater than 21" dbh should be removed or killed from some areas to allow for healthy stand regeneration, if it is needed. If heavily infected overstory trees are left on site, they will continue to infect adjacent intermediate and understory trees, potentially reducing future large tree recruitment within portions of the stand.

(3) **Prescribed Fire**

At this time, prescribed fire alone would not meet the objective of reducing stand density or effectively reducing dwarf mistletoe infection levels. Trees greater than 12 inches in diameter contribute 95% of the basal area in Stand 36. These trees are not likely to be killed by fire given the very low surface and ladder fuels present within the stand. In addition, with most of the stand being made up of larger trees with higher crown base heights, most dwarf mistletoe infected branches would likely survive a prescribed surface fire. In the future, prescribed fire can limit the development of dwarf mistletoe in the stand by killing understory trees and the lower branches of overstory trees where most dwarf mistletoe first becomes established.

It is recommended that any green pine slash created from thinning operations during the late winter or early spring be treated in order to prevent population buildup of the pine engraver beetle (*Ips pini*). Slash treatment methods include chipping, lopping and scattering in sunny areas to heat it up, crushing or mashing slash with logging equipment to make it unsuitable for pine engraver breeding, or piling and burning the slash within a month of cutting. If allowed to sit untreated, infested green pine slash could produce a significant number of adults that may attack live trees. These attacks may result in top kill or whole tree mortality within the stand.

Forest Health Protection can assist with the funding for thinning and removing material from over stocked areas within and adjacent to Stand 36. If you are interested in this funding please contact any of the Forest Health Protection entomology staff for assistance in developing and submitting a proposal.

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For your information, we are including a copy of Agricultural Handbook 709, Dwarf Mistletoes: Biology, Pathology, and Systematics by Frank G. Hawksworth, et.al. If you have any questions regarding this report and/or need additional information please contact us at 530-257-2151

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